NGST The Next Generation Space Telescope (NGST)

Madison AAS
11 June, 1996

- The NGST is a mission concept for a large aperture, radiatively cooled space telescope.
- NASA has initiated a "pre-phase A" study with the goal of determining technical and financial feasibility by summer 1997.
- The study is a joint NASA/Industry/Academia effort with GSFC, MSFC, JPL, Langley, and Ames as participating centers.

The "Origins" of the NGST

- HST & Beyond Committee, recommended that:
  - » The HST Mission be extended beyond its nominal mission date (2005),
  - » NASA study a >4m diameter, radiatively cooled telescope optimized for the near-IR (1-5 microns) to follow HST & SIRTF,
  - » NASA develop the technology for large baseline space interferometry.
- These recommendations have been incorporated into the Origins initiative in NASA HQ.

NGST HST&B Science/Technical Rationale

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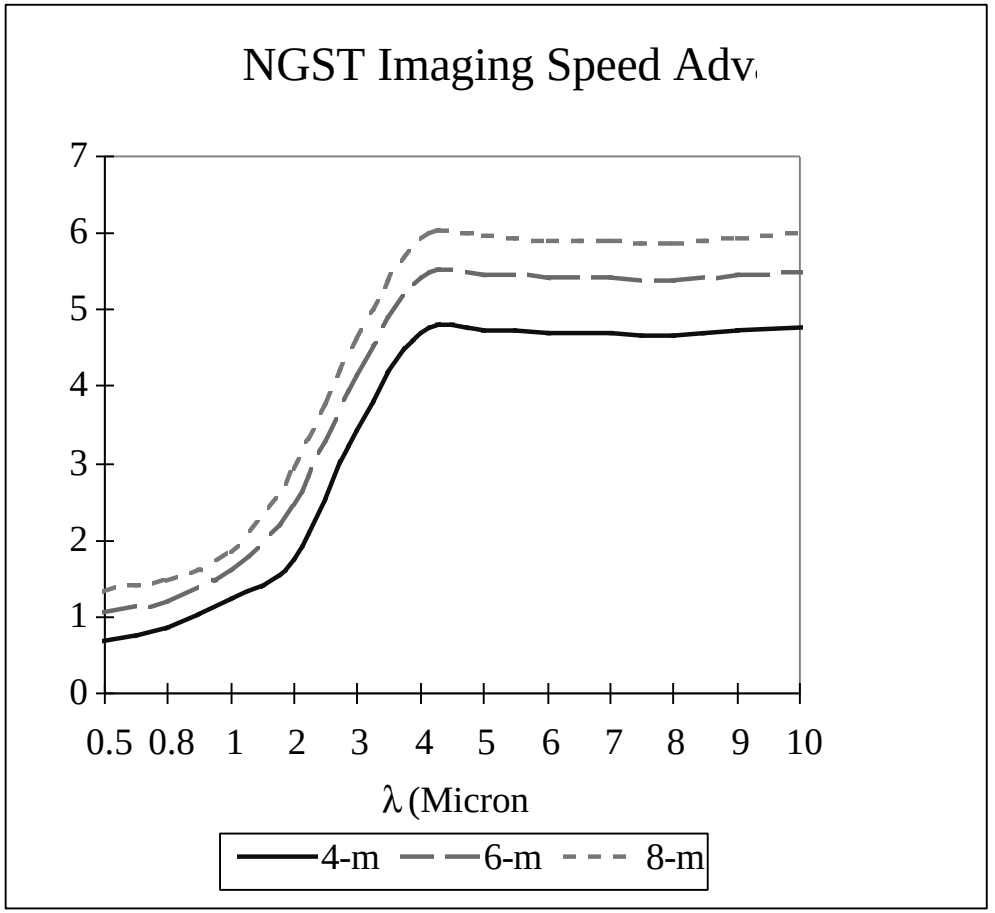
- >4m, low background telescope is needed to probe the origins of stars and galaxies at large redshift.
- Passive cooling breaks the IRAS/ISO/SIRTF paradigm and provides large speed factors in the near & mid-IR.

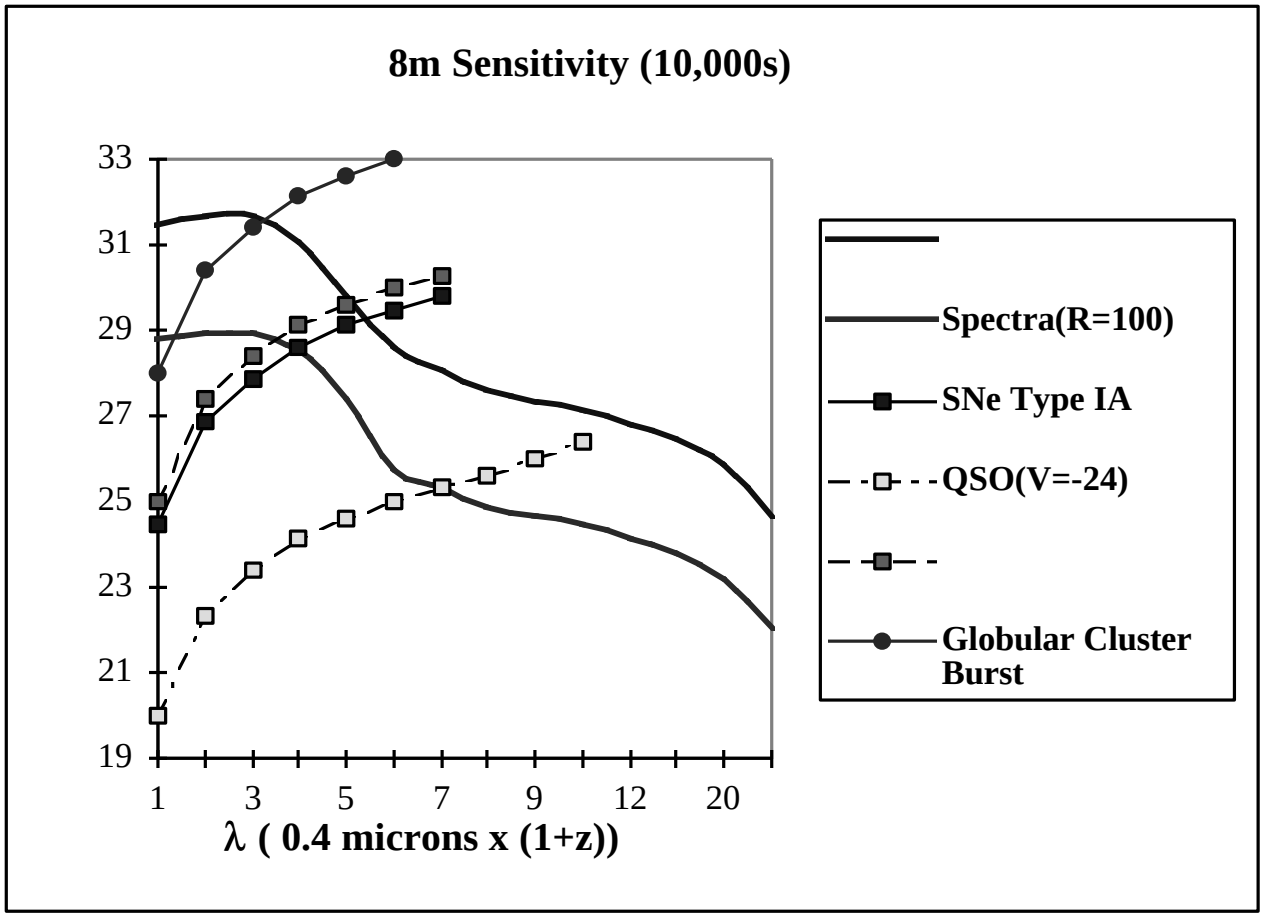


NGST Sample NGST Key Science Goals

- Detect and identify star-forming regions at moderate to high redshift ($1 < z < 10$).
- Detect and identify SNe Type 1a at high redshift.
- Study the astrophysical processes affecting early galaxy formation (e.g. QSOs, protogalaxies).
- Study stellar populations out to the Coma cluster (fossil evidence of various star forming histories).
- Study the Kuiper Belt population/extent from 40-100 AU.

NGST Sensitivity Goals

- Zodiacal light-limited imaging & spectroscopy into TIR.
- Graph assumes about x4 improvement in current detectors.



NGST Breaking the Hubble Cost Curve

- Use an ELV(Atlas 2AS), not the Shuttle;
- Lightweight materials (e.g. optics & shield);
- Smart control systems to reduce vibration;
- Active optics for fine guidance and to remove residual aberrations (fast steering mirror & DM);
- Use of common spacecraft bus components;
- Reduce science instrument complexity;
- Coordinate Origins technology development.

Elements of First NGST Design Concept

- L2 Orbit (1,500,000 km from Earth -- anti-sun),
- Deployable primary and secondary mirror(!),
- Separate bus to hold avionics, sunshield, power, and communications,
- Inflatable double sun shield to lower optics temperature to 30K.

Feasibility Study Status

- GSFC-led NASA study initiated in December.
- Established Science Advisory Committee &volunteer SWG (more are welcome).
- Two independent studies led by Lockheed Martin and TRW (w. academia and other industries and NASA Centers) will report by 15 August.
- Study integration in Aug-Sept. and an interim report will be distributed in Nov.

Feasibility Study Status(Cont.)

- Completed feasibility study, will be presented to NASA-HQ in summer 1997
  - » Design
  - » Estimated Costs
  - » Technology "Roadmap"
  - » Recommended Management and Development Program.

NGST Opportunities for Broader Community Involvement

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- IR & Radio Astronomy NRA: Proposals due 5 July (Low noise, large format detectors)
- SWG Volunteers welcome (stockman@stsci.edu)
- ESO & ESA staff given green light to join NGST study (greater European involvement anticipated)
- Web page is http://saturn1.gsfc.nasa.gov/ngst/
- Send ideas or concerns to Science Advisory Committee (Rob Kennicutt) John Mather or Peter Stockman